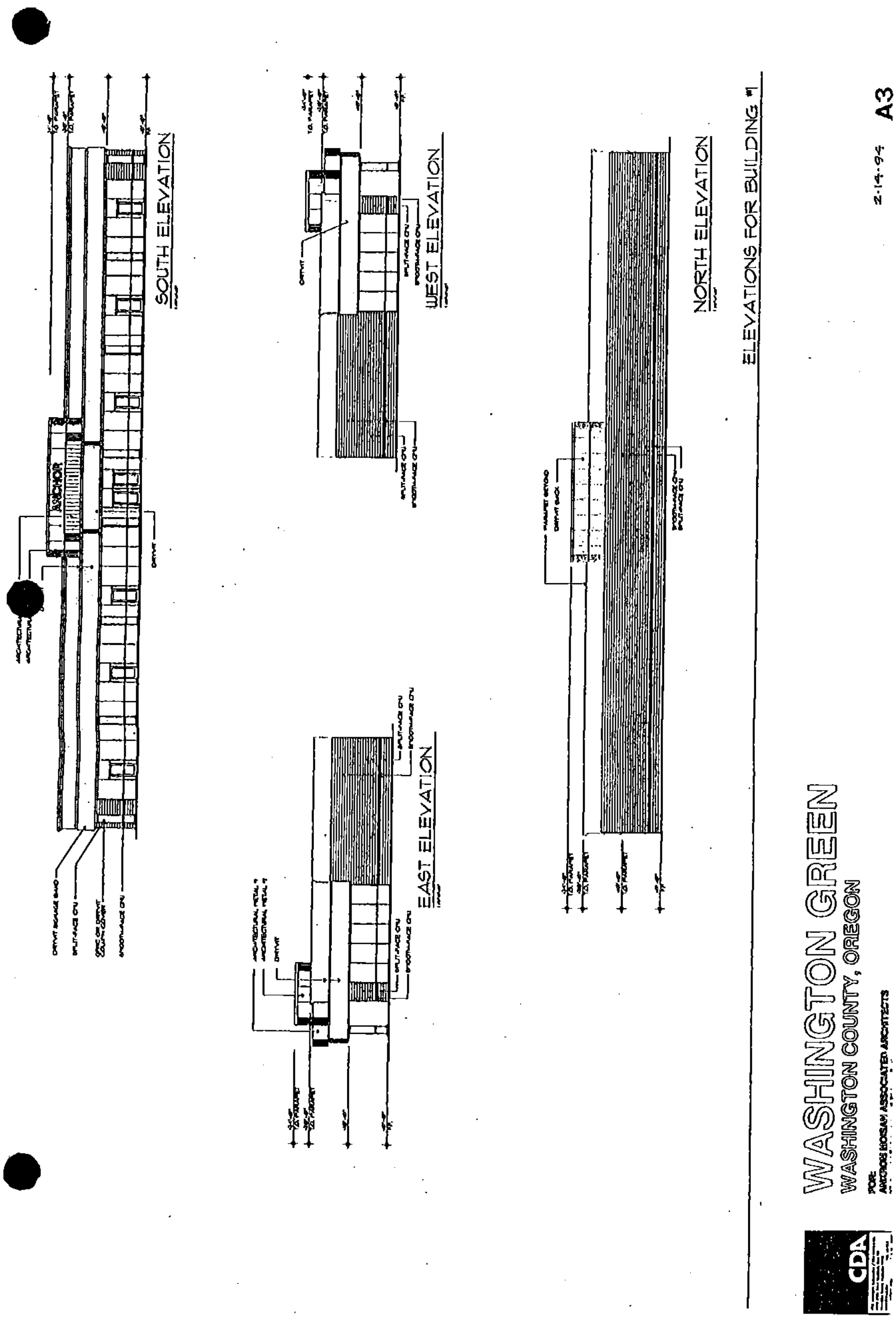
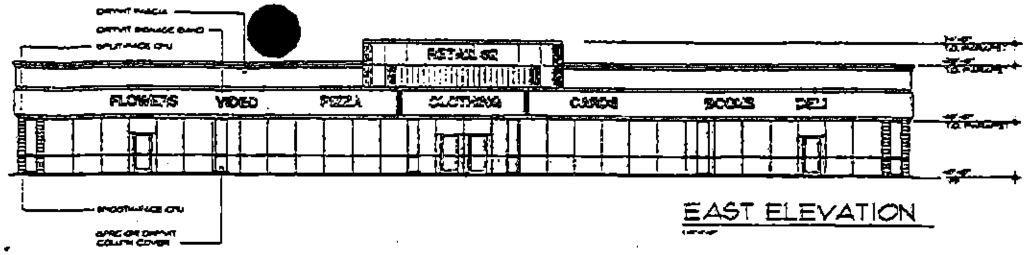
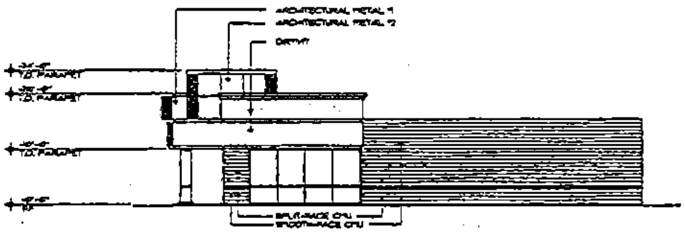
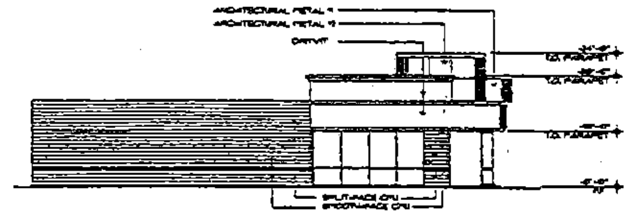

SOUTH ELEVATION
WEST ELEVATION
NORTH ELEVATION
EAST ELEVATION
ELEVATIONS FOR BUILDING #1
2-14-94
A3
WASHINGTON GREEN
WASHINGTON COUNTY, OREGON
CDA



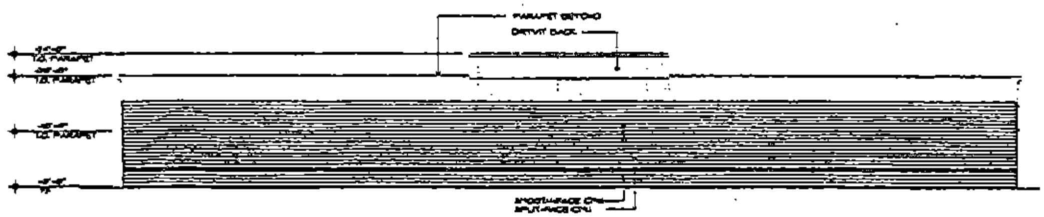
EAST ELEVATION



NORTH ELEVATION



SOUTH ELEVATION



WEST ELEVATION

ELEVATIONS FOR BUILDING #2

WASHINGTON GREEN
WASHINGTON COUNTY, OREGON

FOR:
ANDRON MOSAN ASSOCIATED ARCHITECTS

2-14-94

A4

Attachment "3"

Standards for Grading Work

1. The Land and the Shopping Center shall be graded in accordance with the Site Plan Submission and the following:

(a) The Grading Plan shall show contours in accordance with standard engineering practice and these contours shall be shown with the existing (shown as a dashed line) and final (shown as a solid line) elevations. Whether existing or proposed, all buildings, improvements, roads and highways, including those adjacent to the Shopping Center, shall be shown in their true locations.

(b) The Building will be accessible by grade level parking only. Steps and stairs are not permitted except as shown on the Site Plan Submission.

(c) Sidewalk at the Building will be constructed by Tenant and will slope away from the Building with grade of no less than 1.5% and no more than 3.0%. All water shall be sheet drained away from the Tenant's doors.

(d) Asphalt paving areas will be graded to avoid ponding water with slopes as shown on the Site Plan Submission. Entrances and access drives shall have a maximum slope of 6.0%.

(e) Surface drainage swales other than the biofiltration swale shown on the Site Plan Submission will not be allowed without prior approval of Tenant.

(f) All structural fill material must be of a select grade.

(g) No retaining walls or embankments causing breaks in grade shall be permitted except as shown on the Site Plan Submission.

2. "Tenant's Pad Area" shall be defined as the area extending five (5) feet beyond the Building walls and truck dock and ramp area, or to the back of curbing around the Building, whichever is further. The Landlord shall, in addition to the other pad preparation requirements contained in the Lease, prepare the Tenant's Pad Area at a slope of 3:1 to grade, and to otherwise prepare such area so that the Tenant may construct the retaining wall shown in the Plans and Specifications with a minimum of additional grading and fill work. The Tenant will remove excess materials produced as the result of installation of its retaining wall and locate

same at a site within the Shopping Center designated by the Landlord. The Site Work shall comply with the following additional requirements:

(a) Landlord shall be responsible for preparing the Tenant's Pad Area subgrades to within plus or minus one-tenth of a foot as set by the Site Plan Submission. Tenant's subgrades are typically 8"-10" below finish floor elevation. Landlord will complete compaction in accordance with the appropriate engineering standards and building code requirements, but in no event less than ninety-five percent (95%) of the modified proctor soil test for water content and compaction levels ("Modified Proctor") on the upper three (3) feet of the Land, and ninety-two percent (92%) Modified Proctor for material below three (3) feet on the Land, so as to enable Landlord to perform construction work necessary to provide completed Improvements in accordance with the "Plans and Specifications" (defined in the Construction Provisions), with standard footings and without the necessity of pilings or spread footings or other extraordinary foundation work. Tenant's minimum slab thickness and under slab fill will be established in accordance with Landlord's geotechnical report attached as Attachment "3A". All compacted areas of the site shall be verified by an independent professional soils engineering test laboratory and a certificate from such independent laboratory indicating compliance with the soils report shall be furnished to Tenant upon completion of the Site Work, at Landlord's expense. The greater of three in-place compaction tests per work day or one in-place compaction test per 5,000 square feet of pad area must be completed.

(b) Tenant's Pad Area soil shall have a minimum bearing capacity of 2,500 pounds per square foot. Earth stabilization and/or replacement shall be performed by Landlord as necessary to meet this minimum requirement.

(c) On or before May 18, 1994, Landlord shall provide Tenant with:

(i) An independent soils engineer's written certification based on its tests and observations that all pad work was completed generally in accordance with the Site Plan Submission and the Plans and Specifications. This report shall include the results of all compaction and other tests performed during the pad preparation phase and any tests performed prior to the date of such certification.

(ii) A surveyor's written elevation certification stating that Tenant's Pad Area is at the prescribed elevation within the stated tolerance of plus or minus one-tenth of a foot. This certification shall be based on elevation shots taken on a 50-foot-grid minimum

including pad perimeter and corners. Promptly upon completion of the Site Work, Landlord shall cause its surveyor or engineer to designate the corners of the Land by means of standard surveying monuments.

(d) Landscaping slopes and berms shall be set by Landlord to preserve the integrity of the slopes as determined by an independent soils engineer. However, in no case may the slope of a landscaping berm exceed 3 to 1 in turf areas, or 2 to 1 in ground cover and shrub areas.

(e) All material, including native and fill, within 3 feet of any surface of the building including foundation concrete, shall be nonexpansive with a plasticity index of 12 or less. No oversize material or lumps greater than 6" in diameter will be allowed and not more than 15% of the material shall be greater than 2-1/2" diameter.

(f) The Grading Plans shall not be materially changed by Landlord without the prior consent of Tenant, which consent shall not be unreasonably withheld or delayed.

(g) All outlots or future building areas shall be rough graded and planted with grass seed.

ATTACHMENT "3A"

Applied Geotechnology Inc.

A report prepared for:

Mr. John James
James Property Investments
Building I, Suite G
Bend, Oregon 97702

GEOTECHNICAL INVESTIGATION AND REPORT
PROPOSED WASHINGTON GREEN RETAIL CENTER
NORTHWEST OF HALL BOULEVARD AND OLESON (GREENBURG) ROAD
WASHINGTON COUNTY, OREGON

AGI Project #30,111.011

APPLIED GEOTECHNOLOGY INC.
541 N.E. 20th, Suite 103
Portland, Oregon 97232

March 16, 1994

Applied Geotechnology Inc.

March 16, 1994 30,111.011

Mr. John James
James Property Investments
15 S.W. Colorado Avenue
Building I, Suite C
Bend, Oregon 97702

GEOTECHNICAL INVESTIGATION AND REPORT
PROPOSED WASHINGTON GREEN RETAIL CENTER
NORTH OF HALL BOULEVARD AND OLESON (GREENBURG) ROAD
WASHINGTON COUNTY, OREGON

Dear Mr. James:

In accordance with our December 23, 1992 proposal and January 24, 1994 proposal amendment, we have completed a geotechnical investigation at the referenced site. This report summarizes our field explorations and laboratory testing and presents our comments and recommendations for project design that relate to site grading and foundations.

BACKGROUND INFORMATION

Site Description. The 6.5±-acre project site is located north of the SW Hall Boulevard, SW Oleson Road, SW Greenburg intersection, approximately 1/2-mile east of Oregon State Highway 217 in the Progress area of unincorporated Washington County (see Vicinity Map - Figure 1). The approximately triangular-shaped site slopes down to the northeast property corner with an average gradient of 3 percent. Pre-development site elevations range from +240.5 ft. (msl) at the northeast property corner to +266 ft. (msl) at the southwest corner.

The Unigard Insurance office building and parking lot lie east of the site, and Progress Downs Golf Course bounds the west and north property lines. Prior on-site land use has been agricultural/residential. Site development during this investigation included demolition of several single family residences and outbuildings, tree and stump removal, abandonment of on-site water wells, and septic tank removal. A former on-site UST was decommissioned in July 1989. AGI observed decommissioning activities as noted in our July 28, 1989 report.

Project Description. The Washington Green Retail Center will include three commercial buildings as shown on Figure 2, Exploration Location Plan: 1) a 59,000±-square foot Circuit City store constructed at +247 ft. finished floor elevation; 2) and two 12,000±-square foot rectangular retail buildings constructed at finished floor elevations +258.3 ft. and +261.5 ft.

Site topography requires cut and fill to grade all three building pads as described below. For all three buildings, maximum cuts and fills will occur at the southwest and northeast corners, respectively, and are summarized in Table 1 below.

Table 1
Building Pad Grading

Building Pad	Plan Finished Floor Elevation, ft.	Maximum Cut	Maximum Fill Depth
Circuit City	247.0	2.0 ft.	5.5 ft.
West Building	261.5	3.5 ft.	4.5 ft.
Center Building	255.3	0.7 ft.	8.8 ft.

The remainder of the site will be graded to allow for surface runoff collection to a storm water quality detention pond at the east property corner.

The north and west exterior walls of the Circuit City store are nearly contiguous with property boundaries (minimal setbacks) which does not allow sufficient distance to permanently slope the pad fill. The pad fill will be sloped to match the ground near the property line. We understand that the fill will be retained permanently by a combination retaining/foundation wall in these areas. The wall footing will be constructed on native soil.

We understand that construction of the building pad for the Circuit City store must be completed by May 1, 1994 together with a suitable construction access road and staging area. Store construction will commence thereafter. Pad construction will occur during the wet, early spring months which will impact earthwork operations. The two smaller retail buildings, associated grading, and parking areas will likely be constructed during drier, summer months. This report addresses recommended methods and materials required for both wet and drier weather construction.

FIELD INVESTIGATION

Field Explorations. On December 9, 1993 AGI acted as observer on your behalf while nine exploratory backhoe test pits were excavated in the proposed Circuit City building area. The test pits were limited in depth to 10 feet. Circuit City retained Kleinfelder for the geotechnical investigation and report. AGI returned to the site in February to perform additional geotechnical investigation and acquire soil data in the Circuit City area which was not provided by the Kleinfelder test pit explorations.

On February 1 and 2, seven borings, designated B-1 through B-7, were drilled over the entire site at locations shown on Figure 2. The borings were drilled using a hollow-stem auger trailer-mounted drilling rig under contract to Greg Vandehey Soil Sampling of Forest Grove, Oregon. Five borings (B-1 through B-5) were advanced to depths ranging from 19 to 30.8 feet for a total footage

drilled of approximately 126 feet. For B-6 and B-7, the drill rig was used to continuously sample the upper 4 feet of soils using thin-walled sampling tubes where the test holes were terminated. AGI Logs of Borings for B-1 through B-7 are included in Appendix A.

The borings were field located from existing landmarks and fence lines. Elevations shown on the Logs of Borings were interpolated from the site plan developed by W & H Pacific. B-2 and B-4 through B-7 were backfilled with hydrated bentonite chips to seal the borings from surface infiltrations. B-1 and B-3 were used to construct temporary observations wells to measure groundwater elevations.

Logging and Sampling. All test borings were logged by an experienced AGI geologist who directed the sampling program and recorded sample depth/type, identified all samples, field classified the soils, recorded relative drill action, and developed a field log of the soil units encountered.

Samples of the soil units encountered were collected at approximate 2-foot intervals using either hydraulically pushed thin-walled tub (ASTM D1587) or Standard Penetration Test (SPT - ASTM D1586). Final boring logs are presented on Figures A-1 through A-7. A detailed description of the exploratory methods and borings is presented. The boring logs include soil unit descriptions, as refined in the laboratory, and their relative depths from the ground surface. The SPT resistance values ("N"-values) and natural moisture contents of all samples are plotted graphically on the boring logs and summarized in Table B-1 presented in Appendix B. Information relative to groundwater is also presented.

LABORATORY TESTING

Classification. All jar samples were visually classified to refine, when necessary, the field soil classification. Atterberg limits (ASTM D423 for Liquid limit and ASTM D424 for plastic limit) were determined for samples representative of the subsurface soils to assist in classifications. The results are shown graphically on the Logs of Borings and are presented on the Plasticity Chart, Figure B-1.

Moisture Contents. Natural moisture contents were taken on all samples in accordance with ASTM D2216. The moisture contents are expressed as a percentage of free water lost by evaporation compared to the dry weight of soil. The values are shown graphically or listed on the Logs of Borings.

Consolidation Testing. Three consolidation tests were performed to evaluate the relative settlement or strain response to applied stresses in the subsurface soils. Consolidation tests result in a plot of strain response versus the logarithm of applied normal stress. The test is performed by adding increasing stress increments to a one-inch thick specimen and allowing sufficient time for primary consolidation strains to occur. The final plot represents the total strain under each load increment and is used to estimate settlement of soils under structural loads. The logarithm of stress versus strain plots for the consolidation tests are presented as Figures B-2 through B-4.

Thin-Walled Tube Samples. All thin-walled tube samples were extruded, classified, and tested for relative strength using a manually operated Torevane and/or Pocket Penetrometer device. Dry densities and water contents were determined for representative portions of the samples. Data from these tests are summarized on Table B-1 presented in Appendix B. Consolidation test specimens were removed, and undisturbed specimens were saved in waxed containers for additional testing should the need arise.

California Bearing Ratio. Compacted California Bearing Ratio (CBR) testing was conducted on a bulk sample collected from one of two shallow (4-foot deep) test pits located in proposed pavement areas. Based on visual observations, subgrade soils encountered in the two test pits were similar. The test pits were backhoe-excavated by Dan Obrist Trucking. The CBR test pit locations are shown on Figure 2. For the CBR testing, a compaction test was performed to develop the modified Proctor curve for the subgrade. Two representative subgrade samples were then compacted to approximately 92 and 95 percent of ASTM D1557 on the wet side of optimum. Each sample was penetrated at one end prior to soaking in a water bath, inverted, soaked, and penetrated on the undisturbed end. All penetration testing and soaking was under a surcharge load equivalent to 20 pounds. Results of the compaction test and compacted CBR test are presented in Appendix B, on Figure B-5 and Table B-2, respectively.

SUBSURFACE CONDITIONS

Foundation Soils. Subsurface conditions at the project site generally consist of approximately 14 to 23 feet of Willamette SILT over residual soils derived from the decomposition of the underlying BASALT bedrock. The soils at Washington Green Retail Center are characterized as three distinct units from the ground surface downward: 1) stiff dark brown SILT with organic fragments and roots (TOPSOIL ZONE), 2) medium stiff to stiff brown SILT with trace to some clay and trace to some fine to medium sand, and 3) very dense, mottled, fine to coarse sandy SILT to silty fine to coarse SAND (decomposed BASALT) grading to weathered BASALT.

TOPSOIL ZONE. The topsoil zone consists of an average 6-inch thickness of stiff, dark brown SILT with organic fragments and roots lies below the ground surface.

Medium stiff to stiff, brown SILT with trace to some fine to medium sand and trace to some clay. Generally stiff from 0.5 to 10.0 feet below ground surface (bgs) with a medium stiff layer encountered in B-3, B-4, and B-5 from approximately 10 to 17 feet bgs. The unit thickness ranges from 14 to 23 feet. Dry densities found for unit samples range from 87.0 to 103.0 pcf with an average of 92.0. Natural moisture content ranges from 23.2 to 39.3 percent and averaged 30.7 percent.

Very dense, mottled, fine to coarse sandy SILT to silty fine to coarse SAND (decomposed BASALT). Residual soil grading into decomposed BASALT was encountered below the SILT. The unit continued to the bottom of the deeper borings (B-1 through B-5). Natural moisture contents in the

A4 to A4

SAND/decomposed BASALT unit ranged from 22.8 to 51.8 percent and averaged 36.1 percent.

Groundwater. Groundwater was observed in B-1 through B-5 while advancing the borings. Temporary observation wells were installed in B-1 and B-3 for additional water measurements. The groundwater data is summarized in Table 2 below.

Table 2
Groundwater Data

Boring ID	Approx. Surface Elevation, ft.	Groundwater While Drilling (2/1 & 2/2/94)		Groundwater Measured 2/16/94	
		Depth, ft.	Elev., ft.	Depth, ft.	Elev., ft.
B-1	265.0	12.0	253.0	9.0	256.0
B-2	257.0	9.5	247.5	n/a	n/a
B-3	249.0	12.5	236.5	15.0	234.0
B-4	248.0	9.5	238.5	n/a	n/a
B-5	241.5	1.5	240.0	n/a	n/a

Expansive Soil Comment. The near surface silts and clayey silts found in the Tualatin Valley area are typically wind-blown loess deposits or lacustrine in nature. They are typically of low to moderate plasticity and low to very low expansion potential. Locally, the soils are considered non-expansive and require no special treatment below foundations and slabs.

SITE GRADING RECOMMENDATIONS

Preliminary Site Preparation. All former backhoe test pits (approximate locations shown on Figure 2), grubbed stump holes, and any other natural or man-made intrusions into the native soils must be re-excavated to expose native undisturbed soils and backfilled with 3/4"-0 crushed base aggregate rock which meets the specification by Oregon Department of Transportation (ODOT) "Standard Specifications for Highway Construction", 1991, Section 02630. The base rock should be placed in 9-inch maximum loose lifts and compacted to 92 percent of the maximum density determined by ASTM D 1557 (Modified Proctor) to within 3 feet of subgrade and to 95 percent for the upper 3 feet.

As part of their environmental site assessment, Circuit City's consultant (Raisenan and Associates) identified several magnetic anomalies, suspected of being underground storage tanks. Raisenen explored those areas with a backhoe, finding a septic tank and two trash piles as noted on Figure 2. The septic tank was apparently not removed with other site work. These areas should be identified, the trash piles and septic tank removed to expose undisturbed native soils, and the excavations backfilled to grade as recommended above for the test pits.

Stripping and Building Pad Preparation. We recommend that all grass, root mats, debris and trash piles, loose surficial organic soils, stumps, and rocks over 1¼ inches in diameter be stripped from all building pad and pavement areas. We expect an average stripping depth of 6 inches which is sufficient to remove the organic root zone.

During wet weather, removal of the sod and topsoil will expose very "tender" subgrades that are subject to disturbance. We recommend that stripping and excavation be performed with an excavator and straight-edged bucket. During wet weather, stripping and excavation in building pad areas should be performed without traversing the subgrade.

Weather and ground conditions permitting, the building pad fill areas should be proof-rolled (loaded or unloaded dump truck) and/or probed to detect any soft or unsuitable areas. The stripping, over-excavating, and proof-rolling and probing to identify unsuitable conditions at subgrade should be observed by the Engineer to ensure adequacy of the site preparations. Site filling may follow over approved subgrade surfaces.

Building Pad Materials and Placement. Normally, during summer months (typically July through October), the native soils can be used as structural fill if schedule and working space allows for moisture conditioning (drying out) to meet compaction specifications. Compaction of native soils to structural fill specifications will not be possible during the wet season (typically November through June). The native soils are moisture sensitive, becoming soft under construction traffic during wet weather.

AGI recommendations for both wet and dry weather fill placement are presented below.

- Wet Weather - Realizing that the Circuit City building pad must be completed by May 1, 1994, it will not be possible to use native soils as fill. We recommend that the Circuit City building pad be constructed with crushed base aggregate rock (1½"-0) meeting the previously cited ODOT specifications. Our local experience indicates that the material will allow for compaction during most wet weather conditions. Delays should be expected during heavy downpours. The moisture content of incoming loads should be monitored for excessive water. Typically, this material will allow for the greatest deviation from optimum moisture content and still achieve compaction specifications.

  ODOT crushed base aggregate is recommended above because our experience with it in wet weather is positive. Alternate granular materials will be considered if the Contractor can demonstrate that they can meet all compaction specifications during the prevailing construction weather conditions. We recommend that we be retained to evaluate alternates. As a minimum, ODOT crushed aggregate must be used in the upper 12 inches of the Circuit City pad and for the full 18-inch depth in cut areas.

  For wet weather fill placement in building pad areas, we recommend that cut areas be over-excavated by 18 inches below proposed slab subgrade

elevation to provide a minimum 16-inch structural fill thickness. This minimum thickness should extend at least 5 feet beyond footing lines. In our opinion, this minimum thickness is required for a stable construction surface.

The crushed rock should be spread in maximum 9-inch loose lifts for compaction by self-propelled or tractor-towed compactors. The first two lifts should be carefully placed and rolled with a static roller. If compaction is successful and SILT subgrade integrity is preserved, suitable vibrating equipment may be used on successive lifts. All building pad fill must be compacted to 95 percent of ASTM D 1557.

- Dry Weather - During dry summer months, structural fill may consist of either native, on-site non-organic SILT or imported granular material. 1½"-0 crushed "reject rock", available from local quarries, can be used if the material's moisture content at delivery time allows for compaction. If the material is too wet, the material should be rejected.

  Native SILT in-situ moisture contents average 31 percent, approximately twice the optimum moisture content (16.8 percent). If native materials are used as building pad fill, drying the soil to optimum moisture content will be necessary. Large areas are typically required for drying and redrying after periodic precipitation. The drying and processing may result in discontinuous fill operations and construction delays.

Building pads should extend full-depth at least 5 feet beyond building edges where retaining walls will not retain the fill. Pad edges should slope to grade at 3H:1V. After retaining wall construction at the Circuit City store, 3/4"-0 ODOT crushed base aggregate rock should be used as interior backfill. The backfill should be compacted with suitable manually-guided equipment using 6-inch loose lifts.

Placement of the building pad fill will induce settlements in the underlying soils. Maximum settlement of the planned fill depths is 0.5 inches. Most settlement will occur elastically, as the fill is placed.

<u>Structural Fill Compaction</u>. All native and imported structural fill should be spread in maximum 9-inch loose lifts for compaction by heavy, self-propelled or tractor-towed compactors and maximum 6-inch loose lifts for light, manually-guided compactors. Each lift should be thoroughly compacted to the appropriate criterion (see Table 3) with equipment suitable to the soil types being compacted. We recommend that structural fill compaction specifications be based on ASTM D1557 (Modified Proctor). Prior to compacting each lift, the fill should be properly moisture-conditioned by uniformly adding water or by drying, as required, to achieve a moisture content which is within ±2 percent of the optimum moisture content as determined by the compaction (Proctor) test.

All compacted fill surfaces should be firm and deflect only slightly beneath rubber-tired construction equipment. Fills which rut, pump, or weave should be considered to possess excess moisture and are not acceptable. These should

A1 to A1

be removed and replaced with fill material of proper moisture content or moisture-conditioned as specified herein.

Table 3
Compaction Specifications

Application	Relative Compaction Specification (ASTM D1557)	
	Imported Granular Material	Native Soils
Building Pad (ODOT Crushed Base Aggregate)	95%	93%
Beneath Foundations	95%	93%
Beneath Slabs-on-Grade	95%	93%
Beneath Sidewalks & Pavements		
Within 3 ft. of Finished Grade	95%	93%
>3 ft. Below Finished Grade	92%	90%
Backfill in Test Pits, Stump Holes, etc.		
Within 3 ft. of Finished Grade	95%	n/a
>3 ft. Below Finished Grade	92%	n/a
Retaining Wall Backfill (see Note #1 below)	95%	93%
Landscaped Areas Above Pipe Zone	92%	88%
Random Site or Landscaping Fill	90%	85%

Notes:
1. Where conflicts occur between values, the higher percentage shall govern.
2. Imported granular fill should be reviewed by geotechnical engineer prior to receiving delivery.
3. Use lightweight, manually guided compactors within 3 feet of all embedded walls.

Slabs-On-Grade. For typical, slabs-on-grade supporting loads of less than 100 psf, slab-on-grade floor systems may be founded over a minimum 6-inch zone of compacted 3/4"-0 or 1 1/2"-0 crushed base aggregate rock that conforms to the previously cited ODOT standards. This assumes that the supporting subgrade is non-organic and the upper 9 inches is compacted to 92% ASTM D1557. If wet weather precludes native silt subgrade compaction or floor loads exceed 100 psf, we recommend a minimum 12-inch aggregate base below slabs.

As discussed above (Building Pad Materials and Placement), the Circuit City building pad will result in a minimum 18-inch aggregate rock zone below slabs-on-grade. The upper few inches of the pad material will become contaminated with mud during construction. The contaminated zone should be removed and the surface fine-graded with 3/4"-0 ODOT base aggregate, compacted to final subgrade.

The silt subgrade and relatively high groundwater levels at the site are expected to produce high soil vapor transmission rates. If moisture sensitive floor coverings (vinyl tile, carpet, sheet vinyl, etc.) will be used, we recommend that a vapor barrier be installed below the slab. The vapor barrier should be a product of recognized stability in a damp soil environment (Moistop or equivalent). A 2-inch damp sand zone is recommended over the vapor barrier (and below the slab) to avoid damage to the vapor barrier.

We recommend a minimum 6-inch slab thickness for all site structures. We recommend that minimum slab reinforcement consist of #4 bars @ 24 inches both ways. If fork lifts, or other heavy wheel/storage loads are anticipated, the slab should be designed as a rigid pavement by the structural engineer.

FOUNDATION RECOMMENDATIONS

Spread Footings. The field explorations indicate that spread footing foundation systems are suitable for proposed structures. We recommend that spread footings be designed for a maximum allowable soil pressure of 2,500 psf when footings bear in properly prepared imported granular or native SILT subgrades. The allowable soil pressure may be increased by 1/3 for seismic loading.

Footings should be located at least 18 inches below the lowest adjacent exterior grade for frost protection and 12 inches below adjacent interior grades for bearing requirements. Minimum footing dimensions of 18 inches wide for continuous footings and 24 inches square for column footings are recommended. Consolidation test data (see Consolidation Test Figures B-1 through B-3) was used to analyze settlements for various footing sizes and configurations.

Estimated settlements are presented versus the "real applied soil stress" on the Settlement Curves - Figure 5. "Real applied stress" equals the dead load plus real live loads and normally is 10 to 15 percent less than the total design load. Maximum expected loads for the Circuit City building are 65 kips and perimeter wall loads are 3 kips. Assuming a real applied stress of about 2,000 (0.85 x 2,500) yields estimated settlements less than 0.5 inches for both continuous and column footings. Differential settlements between adjacent column points are estimated to be about 1/4-inch. We estimate that 80 to 90 percent of the settlement will occur elastically, as loads are applied. The remainder of the settlement will occur within one month of application.

Estimated settlements below footings constructed on approximately 3 feet of compacted granular fill are slightly less than footings constructed on native silt.

Footing Preparation. If footings are excavated into native soil soils during wet weather periods the bearing surfaces will be subject to disturbance during forming and reinforcing steel placement. We recommend that all footings in native soils be provided a 6-inch pad of 3/4"-0 ODOT base aggregate to prevent disturbance. Compact the base aggregate to 95% ASTM D1557.

Subdrainage. A foundation drain is recommended around the perimeter of each building. The drain should consist of a 4-inch diameter, rigid, perforated PVC pipe surrounded by an envelope of drain gravel and drainage quality geotextile according to the details shown on Figures 3.

Seismic. The UBC seismic zonation for western Oregon was changed from Zone 2B to Zone 3 effective January 1, 1993. All site buildings must be designed to Zone 3 requirements. Table 23J of the UBC defines the Site Coefficients for use in seismic analysis. Soil type S_2 (value = 1.2) represents the closest approximation to site conditions and is recommended for use.

Pole Signs. Pier foundation recommendations for pole-mounted signs can be provided upon determination of design overturning loads.

Retaining Walls. Flexible retaining walls free to rotate may use active lateral soil pressures. Rigid walls should use "at-rest" pressures. All retaining wall design recommendations are presented below in Table 4. Backfill placed behind the wall will induce settlements of approximately 0.4 inches maximum.

To avoid hydrostatic pressure behind the retaining walls, we recommend that an interior drain be installed above the footing. The drain should consist of a materials similar to those used for the perimeter footing drain and according to the details shown on Figures 4. The exterior footing drain is not necessary along the retaining walls located along the 5-foot minimum setbacks (northmost and eastmost walls).

Table 4
Retaining Wall Design

Design Item	Design Value
Active Lateral Soil Pressure	35 pcf
At-Rest Lateral Soil Pressure	50 pcf
Passive Lateral Soil Pressure (ultimate)	300 pcf
Friction Coefficient	0.35
Maximum Allowable Toe Pressure	2,500 psf

ACCESS ROAD, STAGING AREA, PAVEMENTS

Access Road. We understand that a temporary construction access road will begin at the main entrance and traverse toward the Circuit City site. We recommend that the access road be constructed of a minimum 18 inches of compacted 1¼"-0 crushed base rock (per ODOT specifications) underlain by a high strength geotextile (Mirafi 500X or equivalent). The filter fabric should be placed at, or below, elevations that coincide with the permanent pavement subgrade elevations. When the permanent pavement is constructed, the overbuilt access road section can be bladed down, and the crushed rock re-used

A4 to A4

for the final pavement section elsewhere, provided that it is not contaminated with silt and clay from construction traffic.

Contractor Staging Area. We understand that the initial grading includes preparation of a staging area pad. We recommend that the pad be constructed with the same methods and materials recommended for the Circuit City pad.

Pavements. The design of flexible pavement sections for this project was accomplished using the AASHTO 1986 design method. For this analysis, we have assumed a Serviceability Index of 2.5 and a 20-year design life. Pavement sections were designed for light duty and heavy duty pavement areas. Based on the foregoing, the design Equivalent 18-kip Axle Load (EAL) in light duty travel lanes is estimated to be less than 5,000 in heavy duty travel lanes to be 30,000. The light duty design traffic loading does not include construction traffic.

The CBR values obtained in our laboratory were converted to resilient modulus (M_r) using a factor of 1500. The selected design M_r value was 3200 psi for the on-site SILT soils compacted to 92% of ASTM D1557. Recommended pavement sections are presented in Table 5. The base aggregate should be compacted to 95% of ASTM D1557. The upper two inches of 1 1/2"-0 base aggregate can be replaced with 3/4"-0 base aggregate to facilitate final grading.

Table 5
Pavement Sections

Pavement Material	Design Thickness (inches)	
	Heavy Duty (30,000 EAL)	Light Duty (5,000 EAL)
Asphaltic Concrete	4	2 1/2
1 1/2"-0 Crushed Base Aggregate Rock	8	6
Compacted Native Subgrade	9	8

When the subgrade cannot be compacted due to wet weather, the aggregate base section should be increased to 16 inches for heavy duty pavement areas and to 12 inches for light duty pavement areas.

QUALITY CONTROL

AGI is prepared to provide on-site quality control of grading operations at your request. In our opinion, such work is important to review the following items:

1. Adequacy of stripping depth
2. Replacement of test pit materials
3. Soft spot identification/correction
4. Adequacy of stripped subgrade to receive fill
5. Structural fill material quality, placement, and compaction control
6. Preparation of pavement subgrades, base aggregate
7. Review foundation bearing conditions
8. Retaining wall backfill
9. Foundation drain construction

GENERAL NOTES

This report was prepared solely for the Owner and Engineer for the design of the project. We encourage its review by bidders and/or the Contractor as it relates to factual data only (logs of test pits and laboratory data). The opinions and recommendations contained within the report are not intended to be nor should they be construed to represent a warranty of subsurface conditions but are forwarded to assist in the planning and design process.

If, during construction, unexpected subsurface conditions are encountered within excavations, we should be notified at once so that we may review such conditions and revise our recommendations, if necessary. We request that we be retained to review the applicable portions of the plans and specifications for the project prior to bidding for conformance to our recommendations.

We would be pleased to provide additional input, as necessary, during the design process and to provide on-site observations during construction. Please feel free to contact us for this work as well as for any questions you might have regarding this report.

Very truly yours,

APPLIED GEOTECHNOLOGY INC.

Nancy J. T. Kraushaar

Nancy J. T. Kraushaar, P.E.
Project Engineer

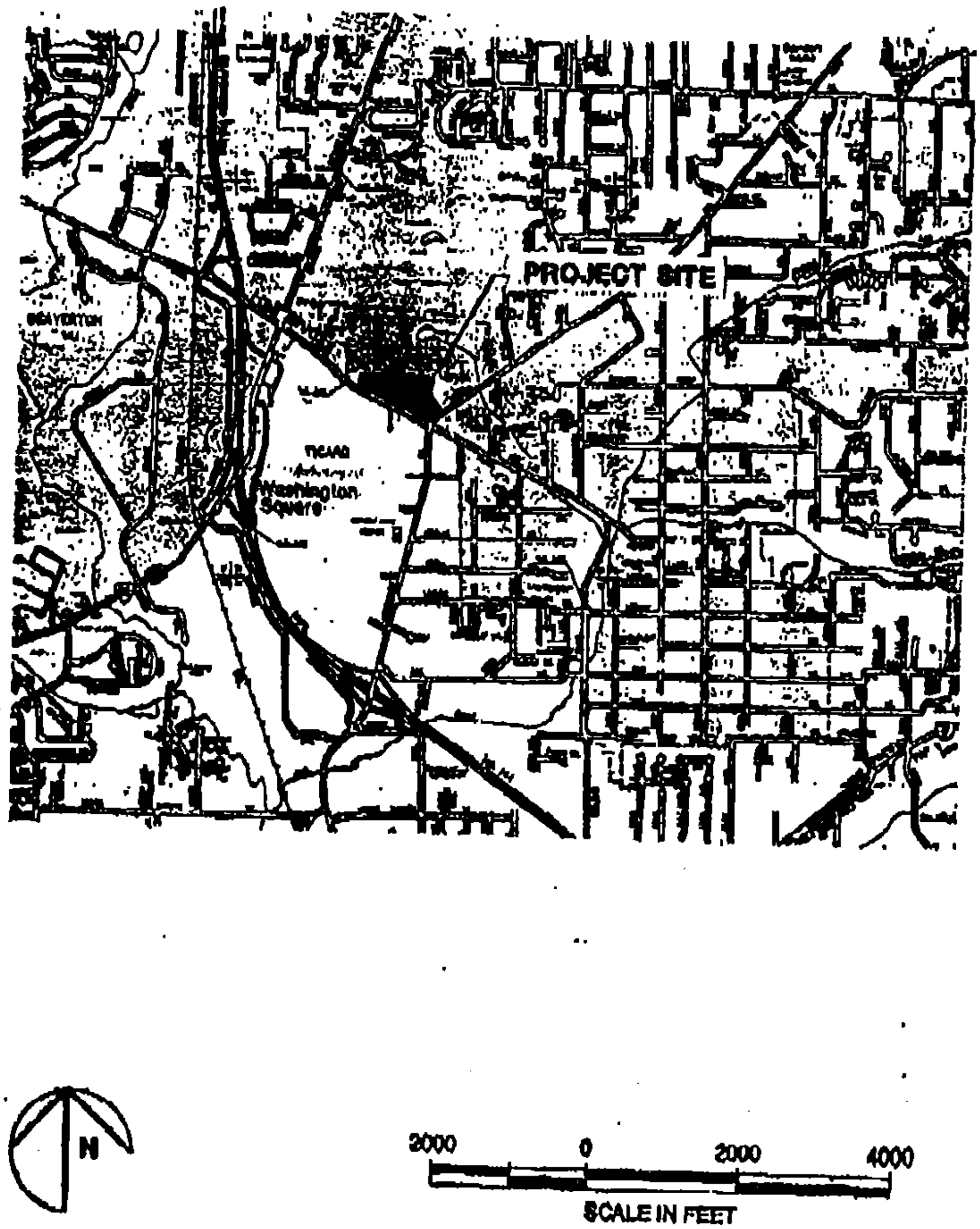
REGISTERED PROFESSIONAL ENGINEER 18,886 OREGON NANCY J.T. KRAUSHAAR

Robert J. Frazer, P.E.
Principal

REGISTERED PROFESSIONAL ENGINEER 8203 OREGON JULY 22, 1977 ROBERT J. FRAZER

Encl: Figure 1 - Vicinity Map
Figure 2 - Exploration Location Plan
Figure 3 - Perimeter Footing Drain Detail
Figure 4 - Retaining Wall Drain Detail
Figure 5 - Settlement Curves
Appendix A - AGI Exploration Procedures
Figures A-1 through A-7
Appendix B - Laboratory Testing & Select Field Data
Tables B-1 and B-2
Figures B-1 through B-5

CIRCUIT CITY RE TEL: 804-527-4186 Apr 05,94 13:28 No.004 P.14



Base Map: Oregon Department of Transportation, Tigard, Oregon 1988

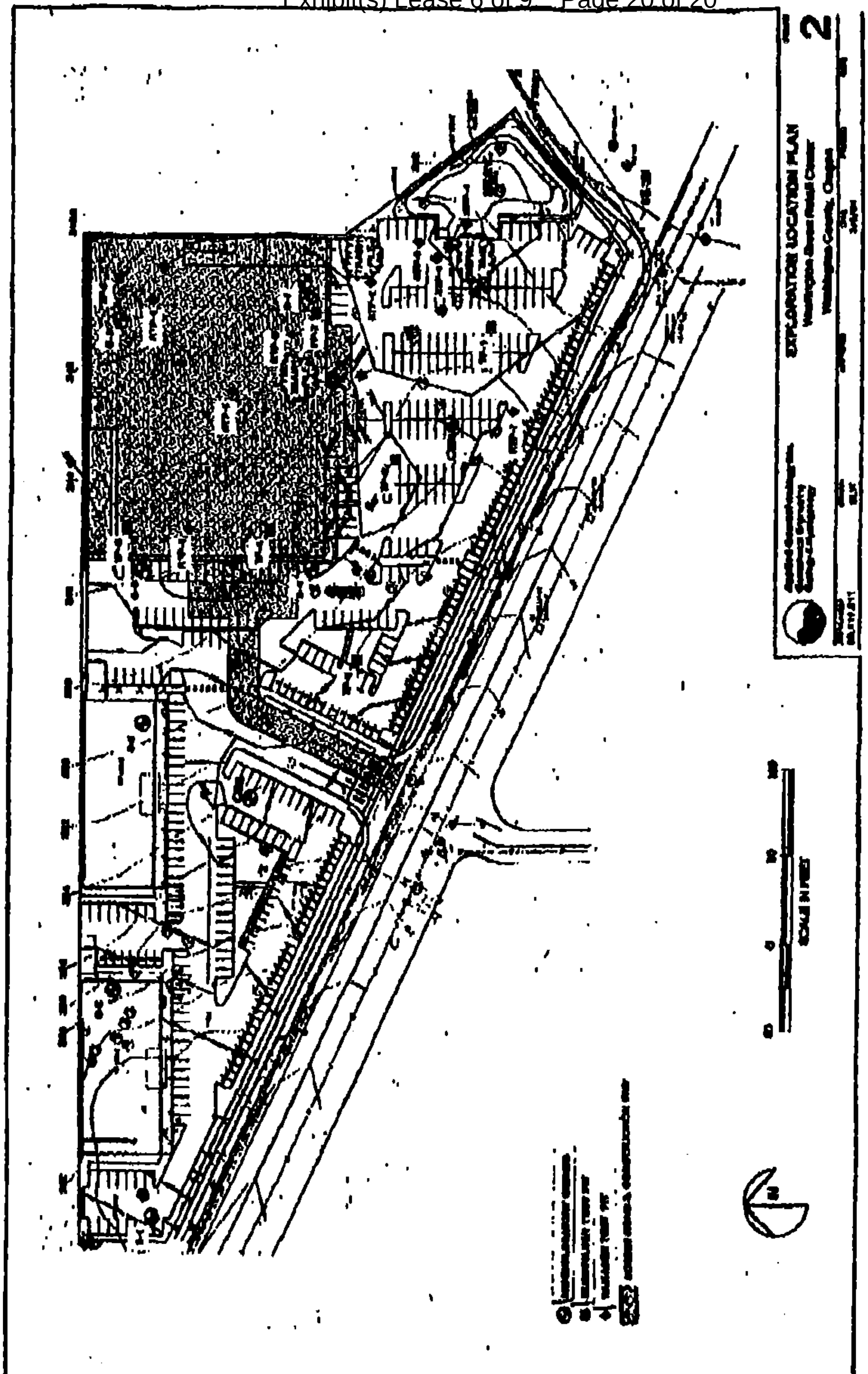
Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

VICINITY MAP
Washington Green Retail Center
Washington County, Oregon

PLATE **1**

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
30,111,011	BLW		8/2/94		

H4 to H4


EXPLORATION LOCATION PLAN
2
SCALE IN FEET